



ALPHA & OMEGA
SEMICONDUCTOR

AOD8N25/AOI8N25

250V, 8A N-Channel MOSFET

General Description

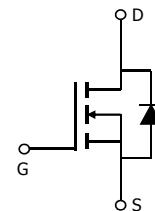
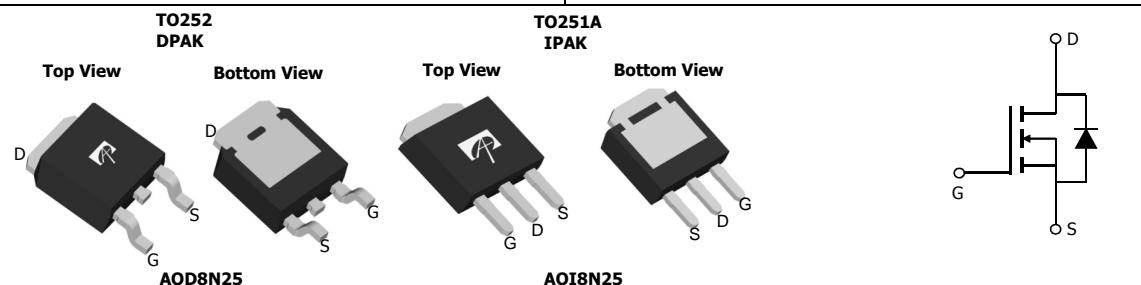
The AOD8N25 & AOI8N25 have been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications.

By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability these parts can be adopted quickly into new and existing offline power supply designs. These parts are ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

Product Summary

V_{DS}	300V@150°C
I_D (at $V_{GS}=10V$)	8A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 0.56Ω

100% UIS Tested!
100% R_g Tested!



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	250	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current ^B	I_D	8	A
$T_C=100^\circ\text{C}$		5	
Pulsed Drain Current ^C	I_{DM}	16	
Avalanche Current ^C	I_{AS}	2.1	A
Single pulsed avalanche energy ^H	E_{AS}	132	mJ
Peak diode recovery dv/dt	dv/dt	5	V/ns
Power Dissipation ^B	P_D	78	W
$T_C=25^\circ\text{C}$		0.63	W/°C
Junction and Storage Temperature Range	T_J, T_{STG}	-50 to 150	°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	T_L	300	°C

Thermal Characteristics

Parameter	Symbol	Typical	Maximum	Units
Maximum Junction-to-Ambient ^{A,G}	$R_{\theta JA}$	45	55	°C/W
Maximum Case-to-sink ^A	$R_{\theta CS}$	-	0.5	°C/W
Maximum Junction-to-Case ^{D,F}	$R_{\theta JC}$	1.3	1.6	°C/W

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$	250			V
		$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=150^\circ\text{C}$		300		
$BV_{DSS}/\Delta T_J$	Zero Gate Voltage Drain Current	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	0.25		$\text{V}/^\circ\text{C}$	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=250\text{V}, V_{GS}=0\text{V}$		1		μA
		$V_{DS}=200\text{V}, T_J=125^\circ\text{C}$		10		
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$			± 100	nA
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=5\text{V}, I_D=250\mu\text{A}$	3.1	3.7	4.3	V
$R_{DS(\text{ON})}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=1.5\text{A}$		0.46	0.56	Ω
g_{FS}	Forward Transconductance	$V_{DS}=40\text{V}, I_D=1.5\text{A}$		5		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.77	1	V
I_S	Maximum Body-Diode Continuous Current				8	A
I_{SM}	Maximum Body-Diode Pulsed Current				16	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$		306		pF
C_{oss}	Output Capacitance			51		pF
C_{rss}	Reverse Transfer Capacitance			3.2		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	1.7	3.4	5.1	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=200\text{V}, I_D=1.5\text{A}$		6.0	7.2	nC
Q_{gs}	Gate Source Charge			2.0		nC
Q_{gd}	Gate Drain Charge			1.5		nC
$t_{D(\text{on})}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=125\text{V}, I_D=1.5\text{A}, R_G=25\Omega$		14		ns
t_r	Turn-On Rise Time			12		ns
$t_{D(\text{off})}$	Turn-Off DelayTime			23		ns
t_f	Turn-Off Fall Time			12		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=1.5\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$		77		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=1.5\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$		0.29		μC

A. The value of R_{BJA} is measured with the device in a still air environment with $T_A=25^\circ\text{C}$.

B. The power dissipation P_D is based on $T_{J(\text{MAX})}=150^\circ\text{C}$ in a TO252 package, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(\text{MAX})}=150^\circ\text{C}$.

D. The R_{BJA} is the sum of the thermal impedance from junction to case R_{BJC} and case to ambient.

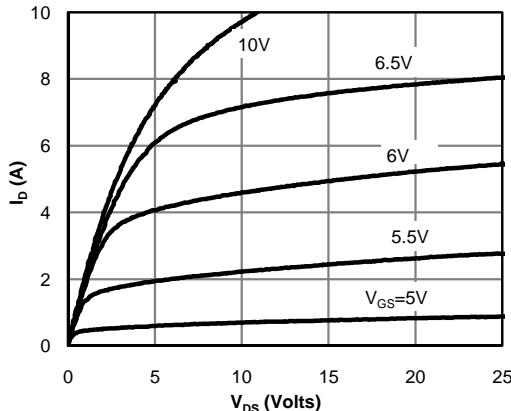
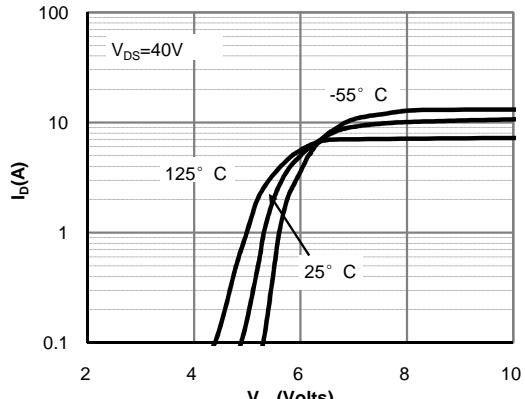
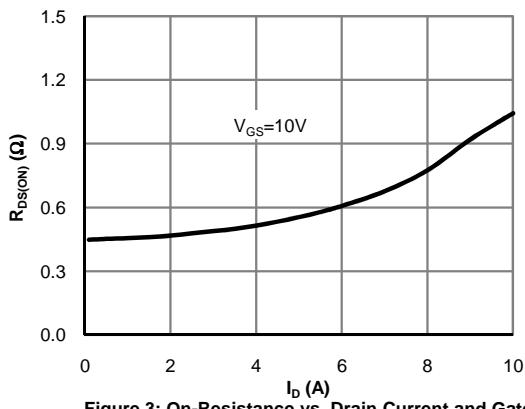
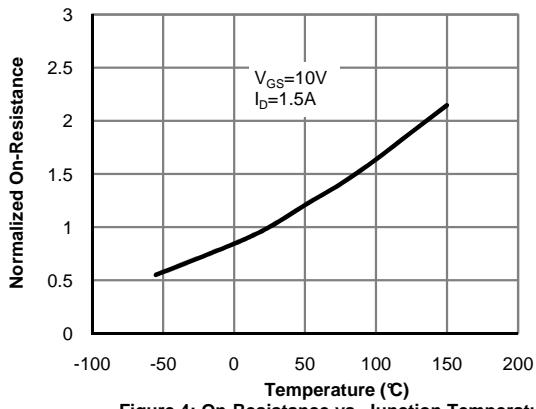
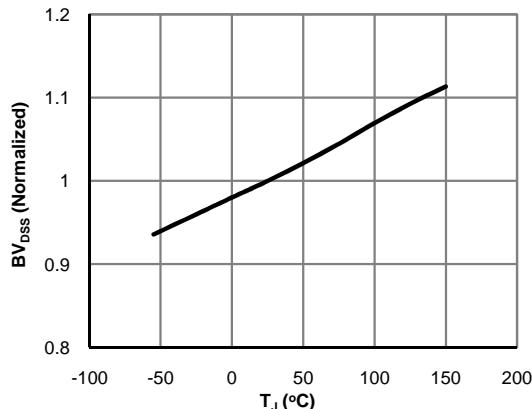
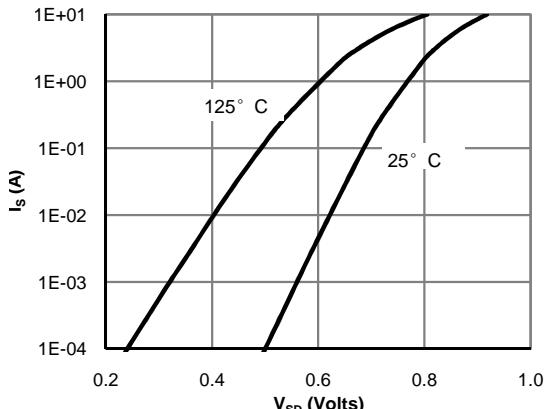
E. The static characteristics in Figures 1 to 6 are obtained using $<300\ \mu\text{s}$ pulses, duty cycle 0.5% max.

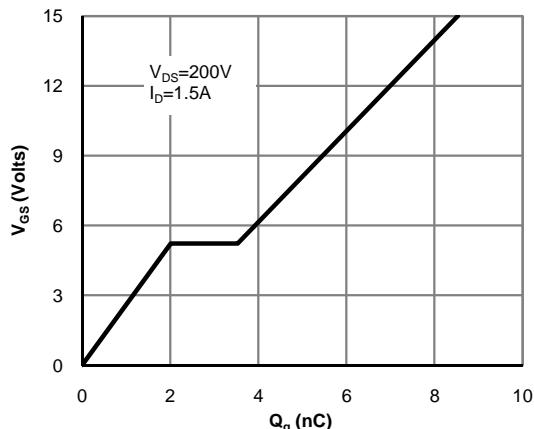
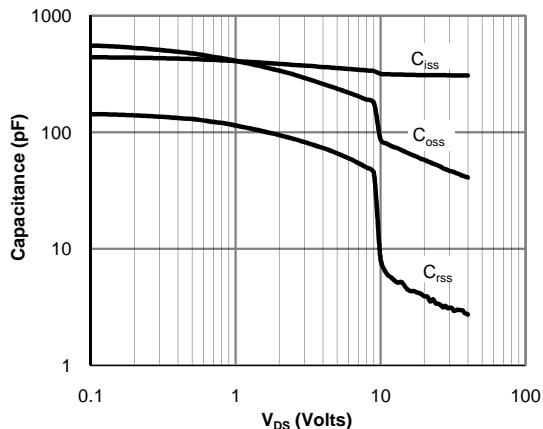
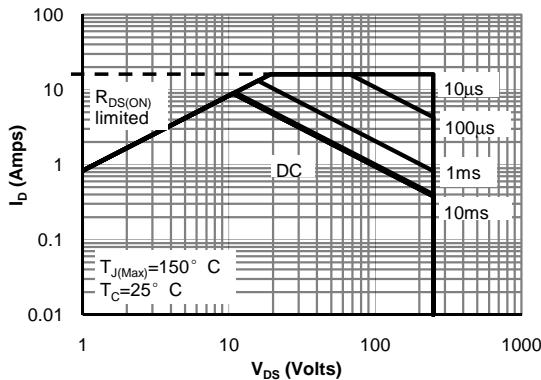
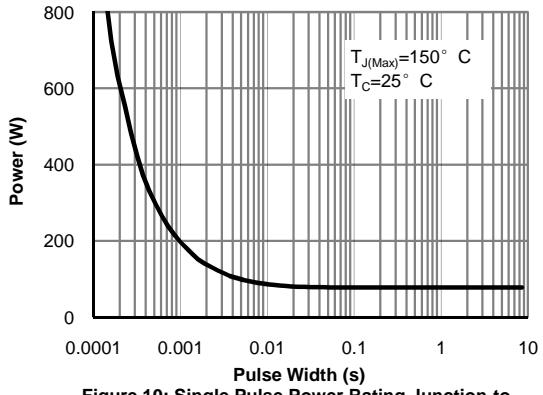
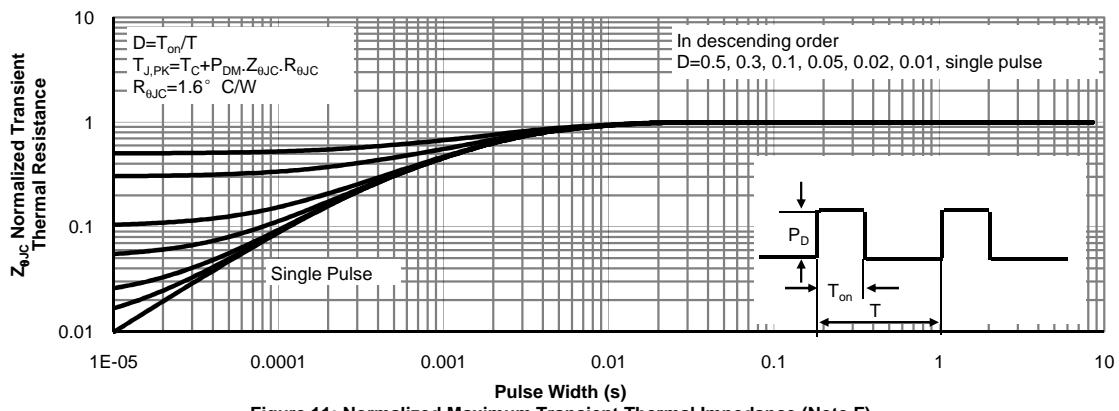
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(\text{MAX})}=150^\circ\text{C}$.

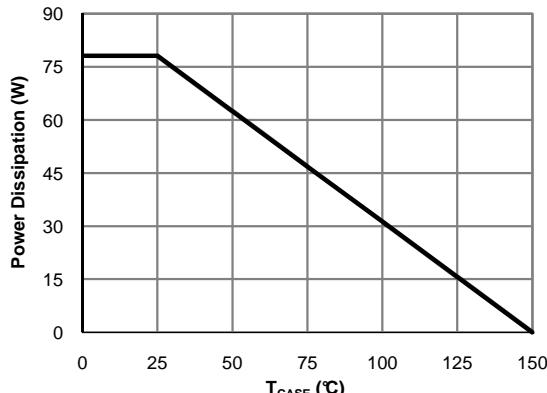
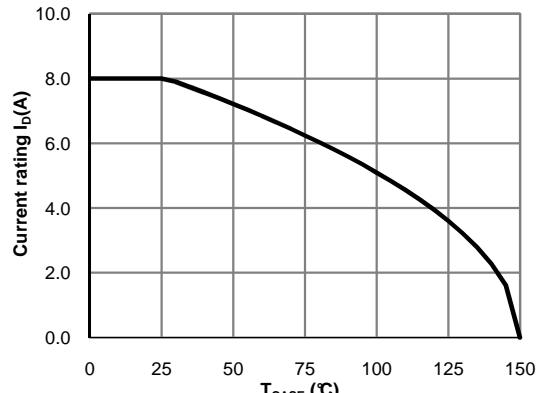
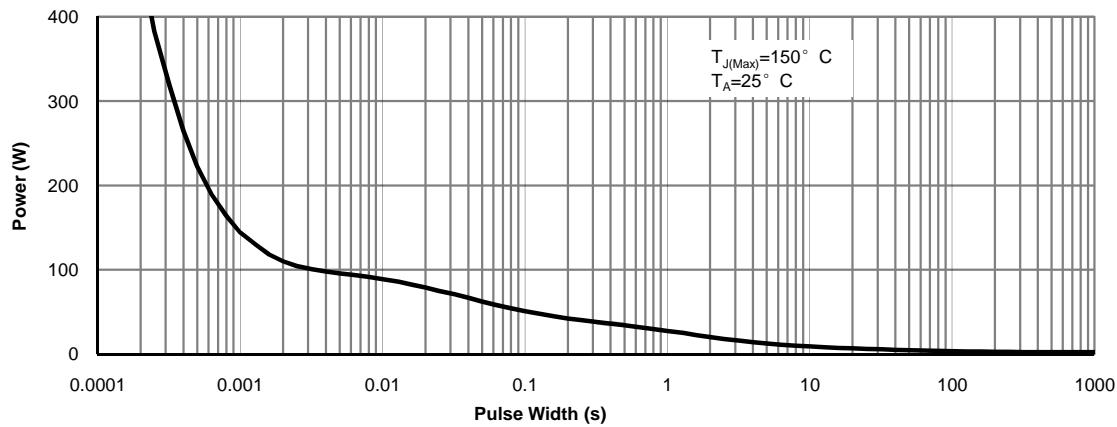
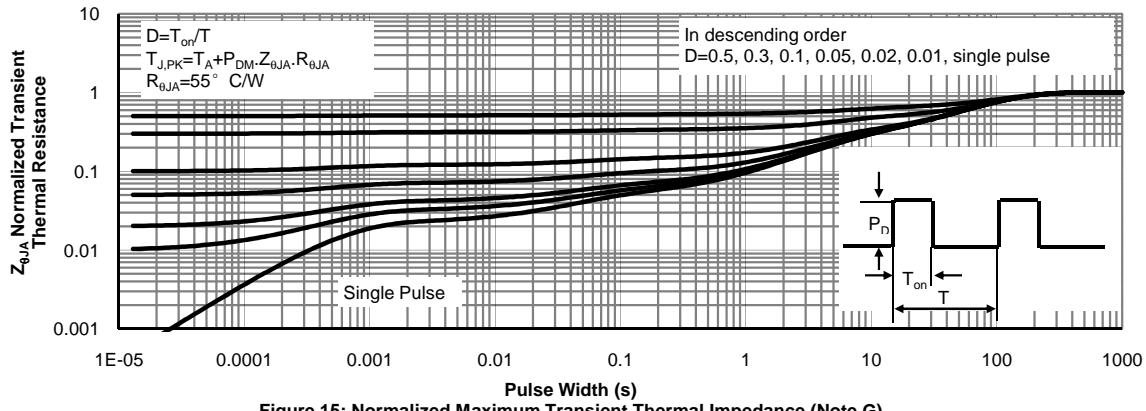
G. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.

H. $L=60\text{mH}, I_{AS}=2.1\text{A}, V_{DD}=150\text{V}, R_G=10\Omega$, Starting $T_J=25^\circ\text{C}$

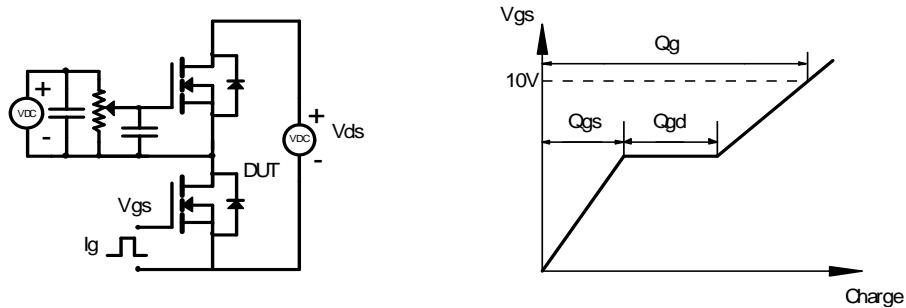
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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 1: On-Region Characteristics

Figure 2: Transfer Characteristics

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

Figure 4: On-Resistance vs. Junction Temperature

Figure 5: Break Down vs. Junction Temperature

Figure 6: Body-Diode Characteristics

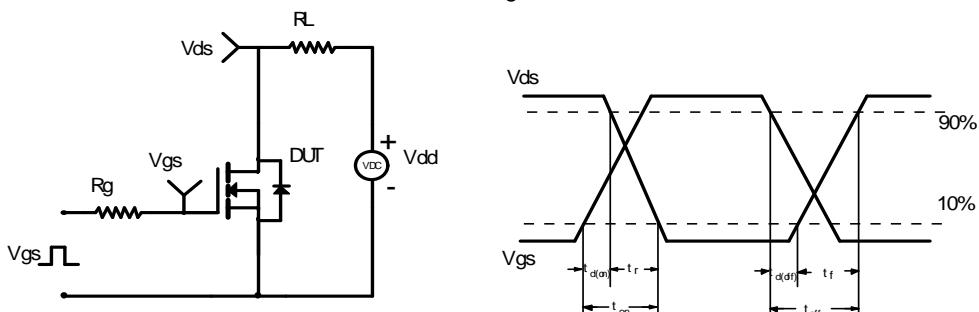
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7: Gate-Charge Characteristics

Figure 8: Capacitance Characteristics

Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 12: Power De-rating (Note B)

Figure 13: Current De-rating (Note B)

Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

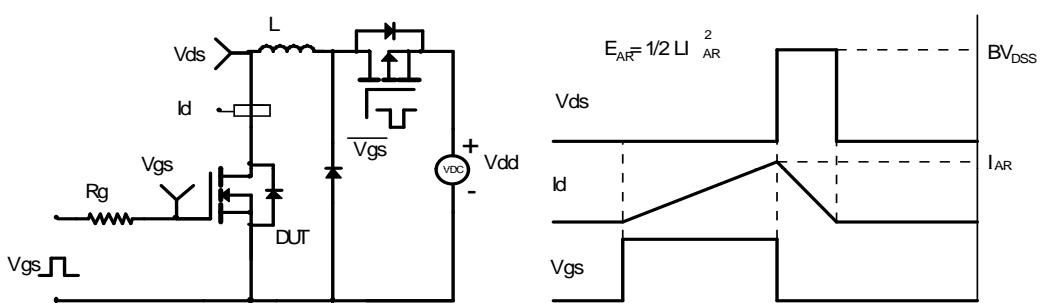
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

